triangles. The definitions are then extended to angles of any magnitude, and formulæ are established for the sum and difference of angles, and for multiple and submultiple angles, &c. There is a chapter on logarithms, and a number of four-figure tables are given. This work leads up to the properties and solution of triangles with applications. Inverse functions are introduced, and general expressions established for angles having given trigonometrical ratios. There are a large number of examples, any necessary answers to which are given at the end of the book.

(5) Part ii. of Messrs. Baker and Bourne's excellent algebra begins by formally establishing the laws of operation of algebraical symbols. It contains chapters on surds and indices, proportion, logarithms, progressions, series, scales of notation, permutations and combinations, the binomial theorem, interest and annuities, exponential and logarithmic series and partial fractions. There are numerous groups of examples, and special sets of revision papers at intervals, the answers being all given in an appendix. A special feature of the book is the frequent use of graphs and of geometrical illustrations. This text-book must give satisfaction wherever used.

(6) Clive's shilling arithmetic is intended for the use of teachers who adopt almost entirely the oral method of instruction, and who only require a class-book containing concise statements of rules, with graduated sets of exercises, and with the formal proofs of theorems omitted. Thus a small volume is sufficient to cover the range of subjects usually taught in schools, and which this manual contains. The book can be obtained with answers included at an extra cost of threepence.

(7) In the graphical statics of Messrs. Alexander and Thompson the authors first give a set of sixteen graduated problems on coplanar forces, solved by means of force and link polygons; these include couples, centres of area and moments of inertia of beam sections. Then follows a set of seventeen examples showing applications to roof trusses, girders, walls, and masonry arches. The treatment is somewhat fragmentary and arbitrary, but, if supplemented by the teacher, the course would prepare a student for a systematic study of graphic statics, and the book is intended more particularly as an introduction to the author's " Elementary Applied Mechanics."

SALT-BEDS AND OCEANS.

Zur Bildung der ozeanischen Salzablagerungen. By J. H. van 't Hoff. Pp. vi+85. (Brunswick: Vieweg and Son.) Price 4 marks.

THIS work will be welcomed alike by chemists, geologists, and oceanographers. It forms the first instalment of the collection into one publication of the results of some forty memoirs of the author and his collaborators on the formation of double salts.

The principal object of the work was the study of the problem of the natural salt beds. As these beds have in all probability been formed by the evaporation of a body of water comparable with the existing oceans, which certainly contain some of everything, it was necessary to set limits to the investigation. This was effected by confining attention to the principal constituents of the salt-beds. These are chloride of sodium, in great preponderance, and the chlorides and sulphates of magnesium and potassium with their water of crystallisation. The latter form a series of more complex bodies which appear and disappear with the changing equilibrium of the solution. After these come the calcium salts, such as anhydrite and polyhalite; but they are held over for treatment in the next fascicule.

The work is a gigantic exercise in physical chemistry, which the author carries through on strictly scientific lines, while at the same time touch is kept with the important applications of his results in the economy of nature, and chemistry is thus vindicated as a branch of natural history.

The experimental part of the work is of especial interest to physical chemists, and the publication of it in a connected and condensed form will be welcomed by them. It is proposed here to notice only the application of it to the occurrence of salts in nature in beds and in solution.

The experimental basis of the work is the determination of the solubility, at certain temperatures, of the common salts of the sea, in water and in solutions of each other. With the information so obtained, it is possible to follow exactly the crystallisation of a solution containing all these salts, as it gradually loses water by evaporation at the temperature of the experiment. The temperature most used is 25° C., which is fairly representative of the temperature of sea water evaporating in salt gardens, such as those of Hyères or Cadiz in summer.

When average sea-water has been evaporated down to the point at which chloride of sodium begins to crystallise, the liquor contains (in molecular proportions) 100 $NaCl$, 2·2 KCl, 7·8 $MgCl_2$, 3·8 $MgSO_4$; and this mixture of salts is associated with, roughly, 1000 mol. H_2O (exactly 1064). On allowing this liquor to evaporate at 25° C., the crystallisation follows a definite route, which can be traced exactly, and without difficulty, on one of those marvellous charts representing the march of physical and chemical phenomena with which the resourceful inventiveness of van 't Hoff has familiarised us.

The crystallisation takes place in four acts corresponding to the regions in the chart.

(1) Rock-salt: separation of chloride of sodium in great abundance. Of the 100 $NaCl$ present when crystallisation began, only 4·6 $NaCl$ remains dissolved; the remainder, 95 $NaCl$, has been deposited.

(2) Kieserite region: separation of chloride of sodium, sulphate of magnesium, and kainite

$$(MgSO_4KCl3H_2O).$$

The salt separated in this act consists of 4·42 $NaCl$, 2·02 KCl, and 3·07 $MgSO_4$; or, 4·42 $NaCl$, 1·05 $MgSO_4$, and 2·02 kainite.

(3) Carnallite region: separation of chloride of sodium, carnallite ($KMgCl_3,6H_2O$), and kieserite ($MgSO_4.H_2O$), and the amounts separated are 0·03 $NaCl$, 0·1 carnallite, and 0·35 kieserite.

(4) Final liquor: what remains solidifies to 0·15

NaCl, 7·62 MgCl$_2$ (bischofite), 0·08 carnallite, and 0·38 kieserite.

	Rock salt	Kieserite	Kainite	Carnallite	Bischofite
(1) ...	95·4	—	—	—	—
(2) ...	4·42	1·05	2·02	—	—
(3) ...	0·03	0·35	—	0·1	—
(4) ...	0·15	0·38	—	0·08	7·62
	100·00	1·78	2·02	0·18	7·62

| 3·8 | 2·2 | 7·8 |
| NaCl | MgSO$_4$ | KCl | MgCl$_2$ |

Within the limits of a notice of this kind it is impossible to give an adequate account of so important a work. It is hoped, however, that the above extract will show that it has an interest for others as well as for chemists.   J. Y. B.

EVOLUTION FOR BEGINNERS.

An Outline of the Theory of Organic Evolution; with a Description of some of the Phenomena which it Explains. By Dr. Maynard M. Metcalf, Professor of Biology in the Woman's College of Baltimore. Pp. xxii + 204. (New York : The Macmillan Company ; London : Macmillan and Co., Ltd., 1904.) Price 10s. 6d. net.

THIS is one of the best popular accounts of the theory of evolution that have come under our notice. The author makes little or no claim to originality, but he has on the whole succeeded in his aim of providing a clear and intelligible statement of evolutionary doctrine in most of its recent developments. Technicalities have been largely avoided; but, as the author truly says, "the subject is somewhat intricate, and cannot be presented in so simple a manner as to require no thought on the reader's part." With regard to controverted points, the position taken is generally sound; Dr. Metcalf has no difficulty in recognising the supreme importance of natural selection, or in rating at their true value the speculations of the Lamarckian school, whether new or old. He rightly lays stress on the great fact of adaptation as affording the most conclusive evidence of the controlling power of selection; "adaptation," as he remarks, "is the key-note of organic nature." To some readers his faith in the beneficial character of certain modifications will seem a trifle too robust; but for the most part he treats this branch of the subject with sound judgment and the force born of reasoned conviction.

An excellent feature of the book is its wealth of pictorial illustration. Many of the figures are already well known, but it is of great advantage to the ordinary reader to have them grouped together in such a way as to throw fresh light on each other, and thus materially to assist his comprehension of the subject. Many of the reproductions of original photographs are particularly good; to "find the woodcock" in plate l. makes an interesting puzzle. The representation of the snow grouse in plate lvii., and of the sargassum fish in plate lxv. are also admirable, while the copies in colour of Tegetmeier's figures of fancy poultry, though a little rough in execution, are amply sufficient for their purpose.

A few points call for criticism. The author is occasionally betrayed into a slipshod or unmeaning expression, as when he speaks of the sun "moving along its appointed daily course under the control of gravitation." A sentence on p. 31 is entirely misleading, unless the word "artificial" be substituted for "natural." The factors to which special attention has been directed by Osborn, Baldwin and Lloyd Morgan, though not ignored, are rather inadequately treated; the author, moreover, falls into some confusion between individual and specific plasticity. On p. 134 Fritz Müller's interpretation of "synaposematic" resemblances is erroneously attributed to Bates. Indeed, the whole subject of common warning colours, which is one of the most interesting and complicated in the entire range of evolution, deserves more extended and more accurate treatment than it receives at Dr. Metcalf's hands. On plate lxxvi. *Papilio merope (caeneae)* is somewhat uncritically assumed to be edible, and on plate lxxvii. we meet with the astonishing statement that the male of *Perrhybris (Mylothris) pyrrha* is edible, and "imitates the inedible Heliconidæ," while the female of the same species "is not a mimic"; the fact being that it is one of the best mimics known, probably of the Müllerian kind. The lettering of many of the plates stands in need of revision.   F. A. D.

OUR BOOK SHELF.

Précis de Chimie physiologique. By Prof. Allyre Chassevant. Pp. iv + 424; illustrated. (Paris : Félix Alcan, 1905.) Price 10 francs.

THIS is a very excellent text-book of physiological chemistry, and it presents the subject in an attractive way. It treats first of the chemical substances found in the body, then of the various liquids and tissues of the organism, and finally of function.

The work contains all the essential facts of this branch of science, without going exhaustively into details; references are given throughout to the names of investigators, but not, as a rule, to their writings. The subjects treated most fully are the urine, the milk, and diet, for the work aims at being not only academic, but also of practical use to the clinical investigator.

The author is well known for his original work in chemical physiology, and he will be personally known also to many in London, as he was one of those who joined in the recent visit of French medical men to London. He possesses what is rarely absent in French writers, a power of clear and lucid exposition. He is fully conversant with recent progress in science, as evidenced by the way he deals with questions in which physical chemistry is involved.

The line between physiology and pathology is never a well defined one, and thus we find in the book subjects like immunity, serum diagnosis, and serum therapy to the fore. It is inevitable that this should be so, for a proper understanding of ferments and anti-ferments, the prime factors in animal chemistry, cannot be attained except through the knowledge and new ideas which were in the first instance the outcome of study in pathological fields.

M. Chassevant is to be congratulated on his interesting work. He has furnished the student, the investigator, and the teacher with what will be useful to all of them.   W. D. H.